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ABSTRACT

Comprehension of metaphor was examined in 36 children ranging in age from 55 months to 186 months. The subjects were audiotaped while answering questions about a target sentence that was contextually anomalous. Five pictures were drawn to accompany each story, two relating to the literal meaning of the target sentence, two to the metaphoric meaning of the target sentence, and one with no apparent connection to the story. Children's responses were analyzed for evidence of literal comprehension through picture manipulation, of metaphoric comprehension through picture manipulation, and of metaphoric comprehension through verbal explanation. Six general stages of comprehension were observed in the study and were found to be compatible with those stages described by J. Piaget. The stages ranged from difficulty with literal comprehension to an immediate understanding and verbal explanation of the metaphoric relation. The stages were developmentally linked in that both the depth of understanding and the ability to explain metaphoric structures increased with age. (RL)

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THE DEVELOPMENT OF THE COMPREHENSION OF METAPHOR

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Metaphor as a mode of thought is evident in domains ranging from the sciences to the arts. Metaphor is unique in that it allows the transfer of meaning from one element to another with an efficiency and effectiveness not attainable through other means. Because metaphoric thought is so pervasive and effective, interest in the development of the comprehension of metaphor has grown. This study examined the extent to which the comprehension of and the ability to explain a contextually embedded verbal metaphor increased with age and cognitive development.

The ability to comprehend metaphor, here defined as the symbolic use of anomalous language (Verbrugge & McCarrell, 1977), requires the ability to ignore explicit dissimilarities while searching for the implicit similarity, or ground of comparison, between two elements. The tension, or disequilibrium, which the comparison of two unlike elements generates is resolved by focusing on the salient attribute of the vehicle (that which carries the metaphoric reference). Equilibriation is regained when that salient attribute is assimilated into the concept of the topic (subject of the metaphoric reference) (Gallagher, 1978). Thus comprehension of metaphor requires the ability to entertain multiple attributes until the salient attribute is identified. This ability, in turn, requires classification skills and the ability to decenter, abilities developed during concrete operations. The flexibility of thought required for metaphor comprehension is reflective of formal operational thought, with its flexible movement among hypotheses (Gallagher, 1978). Thus, it would seem that metaphor comprehension would be a function of cognitive development in that it requires skills characteristic of operational thought. Research has supported this

view (Billow, 1975; Pollio and Pollio, 1974; Piaget et al. 1977.)

Piaget (1977) described the development of children's ability to complete pictorial analogies (a type of comparison closely related to metaphor) and of their ability to explain the analogies in question. He found that the first level of comprehension was characterized by some objective connections between picture pairs but also a heavy reliance on figural resemblances, contiguities, and casual relations. The construction of simple classifications marked the second level, with those classifications becoming progressively more stable until an immediate and stable grasp of the relations of relations characterized the third, and highest, level of comprehension. Piaget thoroughly discussed these levels, differentiating among the stages that comprise them. His method of classification and of analysis, examining the reasoning behind the answers, was used in this study.

Pictorial analogies are, however, different from verbal metaphor, and when assessing the comprehension of verbal metaphor one must consider the linguistic demands of the task as well as the linguistic skill of the responder. The ability to explain metaphoric relations has often been confused with comprehension of metaphor when, in fact, it is a separate ability which rests on comprehension but also involves metalinguistic skill and the ability to discuss analogic relations (Ortony, 1977; Pollio & Pollio, 1974). The linguistic demands of the task also affect metaphor comprehension. Reynolds and Ortony (1980) have found that the language of the metaphor itself influences comprehension; specifically, indirectness (metaphor versus simile) and specificity of reference (including topic as the subject of the meta-

phoric statement). Their findings indicate that metaphor comprehension may occur earlier and be more developed than was previously suspected in that linguistic factors and abilities have often confounded the results of previous studies. Minimizing the linguistic constraints, for example by specifying the topic reference, and providing a non-linguistic means of demonstrating comprehension, for example through picture manipulation, should result in a more accurate representation of comprehension.

Other factors also affect metaphor comprehension. Experiential knowledge is related to the comprehension of metaphor (Ortony, 1977; Ortony, Reynolds & Arter, 1978), as is the embedding of a metaphor in a specific story context (Ortony, Schallert, Reynolds & Antos, 1978). Because of these factors, optimal conditions can be provided for the comprehension of metaphor if the metaphor is embedded in an experientially familiar context. The metaphoric ground and type of connection required also seems to influence comprehension (Billow, 1975; Gardner, Winner, Bechhofer, & Wolf, 1979; Ortony, 1978). For example, a metaphor grounded in a perceptual domain should be comprehended at an earlier age than one grounded in an abstract domain.

The factors identified above led to a research design which considered experiential knowledge, contextual embedding, and type of metaphoric connection. Linguistic factors were also considered, with pictures provided for both a non-verbal demonstration of comprehension and a non-verbal specification of reference. Within this framework, this study addressed the following questions:

What is the extent to which children can comprehend verbal metaphor embedded in a story?

What is the extent to which the comprehension of metaphor varies according to the type of metaphor?

What is the extent to which children can explain verbal metaphor embedded in a story?

What is the extent to which comprehension of and ability to explain metaphor vary with age?

Procedures

A sample of 36 (18 males and 18 females) was drawn from private and public schools in New York and New Jersey. Children were grouped according to age. (See Table 1)

Insert Table 1 about here

Three stories were constructed in which the last, or target, sentence was contextually rather than sententially anomalous; that is, the sentence was literally comprehensible when standing alone but metaphoric within the context of the story. The first story required a metaphoric connection grounded in the perceptual domain (brightness); the second, a metaphoric connection grounded in the functional domain (use as weapons); the third, a metaphoric connection grounded in the abstract domain (endings).

Five pictures were drawn to accompany each story, two relating to the literal meaning of the target sentence, two to the metaphoric meaning of the target sentence, and one with no apparent connection to the story at all. The language of the stories was controlled for syntactic and lexical difficulty. For example, story two was:

> Joe built a snow fort in the backyard. Nancy built a fort in the backyard also. Both of them made a big pile of snowballs. Finally,

they were ready to begin. The bullets flew in both directions.

The target sentence, metaphoric in context but literally comprehensible alone, contained the vehicle, bullets. The topic, snowballs, was not explicit in that sentence but became explicit when the pictures were introduced. The ground of the connection was functional; specifically, use as weapons. The pictures which accompanied this story were of snowballs, bullets, a snowfight, a battle, and a horse.

All situations presented in the stories were judged by the researcher, after consultation with the participants' teachers, to be within the realm of the participants' experience. Questions were constructed which asked about the meaning of the story, the meaning of the target sentence, and the analogy present in each story. Each question could be answered through picture manipulation and all participants were also asked to explain their answers. For example, after story two was read twice, the pictures of the snowballs, the bullets, and the horse were introduced. Each participant labeled the pictures, with help from the researcher if necessary, so that it was clear that she/he knew what each picture was. The participant was then asked: Which picture shows what the story means? How do you know? Could another picture show what the story means? How do you know? The story was then reread and the participant was asked: Which picture shows what the last sentence means? How do you know? Could another picture show what the last sentence means? The last two pictures, the snow fight and the battle, were then introduced,

moving the metaphor into an analogic form, although not a reversible one. The researcher then asked: Can you put these pictures in pairs? One will be left over (The horse). How do these go together? How do you know? The researcher then asked about other possible comparisons, ending with a statement of the analogy if not already given by the participants; for example: Are the snowballs in a snowfight like the bullets in a battle?

Each participant met singly with one of two researchers in a room in the participant's school. Each of the three stories was read orally by the researcher and was followed by the sequenced questions and accompanying pictures. The stories were presented in an increasing order of metaphoric difficulty, from perceptual to functional to abstract grounds (brightness to use as weapons to endings). The sessions were audio-taped and were transcribed by the researchers at the completion of data collection. Notes were also taken by the researchers during data collection.

The protocols were then examined for: evidence of literal comprehension through picture manipulation; evidence of metaphoric comprehension through picture manipulation; evidence of metaphoric comprehension through verbal explanation. These results were then classified with reference to Piaget's (1977) levels. The protocols were classified independently by the second researcher and a level of 95% agreement was obtained.

Results

Six general stages of comprehension compatible with those described by Piaget (1977), were observed in this study. The stages ranged from difficulty with literal comprehension to an immediate

understanding and verbal explanation of the metaphoric relation presented in the story. The stages were developmentally linked in that depth of understanding and the ability to explain metaphoric structures increased with age. (See Table 2)

Insert Table 2 about here

Means and standard deviations of stages of comprehension by story and age are presented in Table 3. Four participants did not

Insert Table 3 about here

discuss all three of the stories and their data were omitted from this and subsequent analyses. One-way ANOVAs on each of three stories indicated a significant main effect for age on all stories (see Tables 4, 5, and 6). Newman-Keuls post hoc comparisons on story one, set at .05, showed there were significant differences between the means for ages one and two and between those means and means for ages three and four. There was no significant difference between means for ages three and four. Newman-Keul post hoc analyses for both stories two and three showed no significant differences between means for ages one and two or ages three and four but the means for both ages one and two were significantly less than the means for ages three and four (see Tables 4, 5, and 6).

Insert Tables 4, 5, and 6 about here

A repeated measure analysis indicated no significant differences in comprehension across stories ($F = (2)\ 2.638$, $p < .08$), although the abstract metaphor of story three was not fully comprehended until the oldest age groups (see Table 2).

Discussion

The stages of metaphor comprehension observed in this study will be discussed in terms of stage characteristics and their parallels with cognitive developmental stages. Possible reasons for the lack of significant difference among kinds of metaphors will also be discussed.

Stage one responses were those in which there were no connections between topic and vehicle and literal picture pairs were not always made. Children at this level were unable to discuss picture pairs presented to them, especially those connected with story one. The pictures which accompanied that story had no figural connection with one another, whereas those which accompanied the other two stories had some figural similarity. It seems that the lack of figural similarity in the pictures inhibited connections even if comprehension of the story was present.

For example, JUL (4, 6) responded to story one:

> Which picture shows what the story means? THIS ONE. STARS. How do you know? BECAUSE THEY'RE STARS. THIS (a line on the picture) ISN'T GOOD. Could any other

picture show what the story means? I THINK THIS. I THINK THE DIAMONDS. How do you know? DID YOU KNOW I HAD A SWING CHAIR? AND A HURT. SEE MY BANDAID. I HURT MYSELF ON MY SWING CHAIR. (Story is reread.) Which picture shows what the last sentence means? THE CAT. BECAUSE IT'S ON THE VERY END (of the row of pictures). Could another picture show what the end of the story is about? NO. Can you make pairs with these pictures? NO.

JUL responded correctly to a literal question about the story by manipulating the pictures; she knew that the stars and the diamonds went with the story. When asked about the last sentence she focused on the physical position indicated by the word "last" and responded by naming the picture of the cat "because it's on the very end," even though her previous statements indicated that she had comprehended the story at the literal level. She chose not to answer the query "How do you know?" evading a response by veering off topic. She could not make pairs of the pictures, but once the pairs were made for her she could tell why those literal pairs went together. She refused all attempts to state the metaphoric relations.

Story two pictures were literally paired once at this stage with no reason given for these pairings other than "they go together." There was a similar lack of reasoning behind the one incidence of pairing for story three, with only those two pictures which had figural similarity being paired.

Stage two responses were those in which metaphoric pairs were sometimes made, with, however, the connection based on figural resemblances. There was no understanding of the metaphoric ground and, when the complete analogy was presented by the researcher, it was rejected. For example, JOH (8,3) responded to story one in this manner:

> Can you put the pictures in pairs? THE SKY AND THE VELVET GO TOGETHER BECAUSE THEY'RE BOTH BLACK. THE STARS AND THE DIAMONDS, THEY BOTH LOOK SORTA LIKE STARS. What do you mean? THEY BOTH LOOK LIKE STARS AND THIS ONE IS AND THEY BOTH LOOK SORT OF THE SAME.

There was also, at this level, a tendancy to explain answers with, "Because it was in the story," or with metonymic, or associative, links. DIA (4, 10) was a good example of this as she responded to story one:

> Which picture shows what the story means? (DAI points to the cat.) How do you know? BECAUSE THE CAT COULD SAY MEOW. Could any other picture show what the story means? THE DIAMONDS. How do you know? THEY COULD SHINE BRIGHT ON YOUR RING. Any other picture? THE STARS. How do you know? BECAUSE THEY COULD BE IN THE SKY TWINKLING.

Stage three was marked by the ability to connect the pictures in slightly more stable metaphoric pairs, with the connections based on functional or physical properties of the pictures as well as figural resemblance. However, dissimilarities interfered with

metaphoric connections and there was still no indication of a clear understanding of the metaphoric ground.

KAT (5, 3) could make the connection between topic and vehicle in story one but the figural dissimilarities of topic and vehicle interfered:

> Could the stars go with the diamonds? YES. THEY'RE BOTH SHINY. Could these go together (sky and velvet)? YES. THEY'RE BOTH BLACK. Are the stars in the sky like the diamonds on the velvet? YEAH. How? THEY'RE BOTH SHINY BUT THE ONLY WAY THEY DON'T GO TOGETHER IS THEY'RE NOT THE SAME SHAPE. STARS ARE CROSSES AND DIAMONDS LOOK LIKE BOTTOMS OF BOATS.

KAT was aware of metaphoric connection between the stars and the diamonds but the dissimilarity in their shapes intruded on her understanding of the metaphoric connection.

Stages one through three comprise the first of Piaget's (1977) levels of development. The chief characteristic of this level is the growing ability to make metaphoric connections between pictures, but an inability to ignore dissimilarities and explain these connections in terms of metaphoric ground.

Stage four responses revealed the ability to construct simple classifications which enabled more stable connections between topic and vehicle. Dissimilarities between topic and vehicle began to be ignored. For example, ZAC (7, 1):

> Could the soldiers go with the snowfight? UM HUM, BECAUSE SNOWBALL FIGHTS ARE KIND OF LIKE A WAR, BUT WITH NO BULLETS BUT BALLS THEY'RE THROWING AT EACH OTHER.

Could the snowballs and the bullets go together? KIND OF THE SAME THING. THEY'RE HAVING A SNOWBALL FIGHT AND THEY'RE HAVING A WAR WITH GUNS. SAME THINGS THAT GO TOGETHER, KIND OF. THEY MATCH THE SAME.

In his response to story 3, ZAC attempted to try to integrate all of the pictures into one coherent story, behavior which appeared with the Stage 4 responses. When discussing the possible pictorial analogy for story three, ZAC proposed that

IT CAN EITHER BE THEY JUST WENT TO THE SHOW AND THEY'RE GOING BACK HOME OR THEY'RE DRIVING TO THE SHOW IN THE CAR AND HE (driver) COULD BE ONE OF THESE MEN (in the audience). Could these (beach and play) go together? MAYBE SHE'S IN THE COUNTRY AND THE BEACH AND SHE GOT INTO HER CLOTHES AND WENT TO THE SHOW. Is the curtain at the end of a play like going home after a vacation? NO.

BEK (7, 11) also was able to construct metaphoric pairs, but only at the end of the discussion when the interviewer had suggested the analogy to her. She could tentatively link the stars and diamonds of story one as well as the velvet and the sky, but did not go beyond this simple relation:

Could the diamonds go with the stars? NO. Could the black velvet go with the sky? NO. Are the stars in the sky like the diamonds on the black velvet? YEAH. How? LIKE THE STARS SHINE AND SO DO THE DIAMONDS AND THE VELVET IS DARK AND SO IS THE SKY.

At this stage the complete analogy was sometimes rejected and sometimes accepted, with a rationale for accepting the analogy only occasionally given.

The topic and vehicle connection was completely stabilized in the ground of the metaphor at stage five. An immediate understanding of the metaphoric meaning of the target sentence was also evident here in that answers to the question Which picture shows what the last sentence means? were based upon the metaphoric rather than literal meaning of the sentence in question. For example, NAN (10, 8) responded to that question for story two by saying:

IT MEANS THAT THEY'RE THROWING SNOWBALLS AT EACH OTHER.

This stage was marked by the ability to arrive at an understanding of and explanation of the metaphor by working through the questions to arrive at the complete analogy presented by the pictures. For example, in response to What does the last sentence mean? for story three, RAC (11, 1) responded:

IT MEANS THE END CAME TO THEIR TRIP. How do you know? BECAUSE IT TOLD YOU. Could it mean something else? OH, IT ISN'T A STORY, IT'S A PLAY. Can you put these pictures in pairs? HERE'S THE PLAY AND THE PEOPLE IN THE PLAY. AND HERE'S THE CAR; THE PEOPLE ARE RETURNING HOME FROM THE BEACH. Can the two pairs go together? THIS (the girl on the beach) IS THE BEGINNING OF THE STORY AND THIS (car) IS SORT OF THE END OF THE STORY. AND THIS IS THE PLAY AND THIS IS THE ENDING OF THE PLAY. So is there a relation between the play and the vacation? THEY'RE THE BEGINNING OF SOMETHING AND THE END OF SOMETHING.

Stage 6 was characterized by an immediate understanding of the metaphor without having to work through the relations. For example,

WEN (15, 5) responded to the question Which picture shows what the story was about? for story three by saying:

> THE ONE WITH THE CAR, SHOWING THE END OF THE VACATION. IT ENDS ALL THE FUN: SHE HAS TO GO BACK TO WHERE SHE CAME FROM. IT'S ALL OVER. IT'S JUST LIKE THE ONE WITH THE CURTAINS, BECAUSE THE CURTAINS WENT DOWN AT THE END OF THE PLAY. EVERYBODY'S CLAPPING. IT WAS GOOD, BUT IT'S OVER.

PET (15, 10) also understood the metaphor implicit in story three, even citing the "context" of the story as the reason she knew that the last sentence was metaphoric:

> IT MEANS THAT, IN THE CONTEXT OF THE STORY, IT MEANS THAT VACATION HAD ENDED, AND, IN A SENSE, IT WAS OVER, WHEREAS THE CURTAIN CAME DOWN ON THE PLAY WHICH WAS THE VACATION.

When discussing the comparison between the two pairs of pictures: she explicitly referred to the analogical relation of the pairs:

> THE SCENE ON THE BEACH OCCURRED FIRST AND THEN THE SCENE WITH THE CAR IS DRIVING HOME FROM THE VACATION. YOU RELATE THAT TO WHERE YOU HAVE PERFORMERS ON THE STAGE AND THE CURTAIN COMING DOWN SO THE SCENE ON THE BEACH IS ANALOGICALLY RELATED TO THE PERFORMERS ON THE STAGE IN THE SENSE THAT DRIVING THE CAR IS GOING HOME, WHICH IS TO THE SCENE ON THE BEACH AS THE CURTAIN COMING DOWN IS TO THE PERFORMANCE.

The linguistic skill needed to discuss the metaphoric connection, lacking or tenuous at previous levels, was present in stage 6, enabling a concise explanation of the metaphor in each story.

An understanding of the metaphoric meaning of the target sentence was present in all but four of the responses of the $\overline{X}_3$ (147 mos.) and $\overline{X}_4$ (186 mos.) groups. The development of the classificatory abilities of concrete operations which generally occurs in the age span between the $\overline{X}_2$ (93 mos.) and these two groups may account for the growth in understanding. This would substantiate the findings of others (Billow, 1975; Piaget et al, 1977). An additional factor is the development of the skills of formal operations, including metalinguistic prowess, which would allow discussion of the target sentence. However, since only one of the younger participants indicated any understanding of the metaphoric meaning of the target sentence, even with the pictures available, it would seem that this kind of metaphoric understanding is a function of age and cognitive development as well as linguistic ability.

Although evidence of the ability to understand metaphoric relations through picture manipulation was present in $\overline{X}_1$ (55 mos.) and $\overline{X}_2$ (93 mos.) groups, indications of an understanding of the metaphoric meaning of the target sentence either through verbal explanation or picture manipulation was present in only one response. This may indicate that an analogy presented in pictorial form is easier to comprehend than a verbal metaphor embedded in a story context. If that is the case it becomes important to examine the reasons behind the comprehension of the pictorial analogies. Some of the participants did base their metaphoric pairings on the metaphoric ground, however tenuous the connections. Others, however, based their pairs on peripheral relations, such as figural similarity, rather than on the metaphoric ground. If topic and vehicle are linked because of a figural

similarity, for example, snowballs and bullets linked because they're both pictured in the air, is that an indication of metaphor comprehension? It is clearly important that researchers question children about the grounds of their seemingly metaphoric understandings.

Although the abstract metaphor of story three seemed to present the most difficult task, the differences in comprehension among stories, while present, were not significant. This may be due to two factors. The small number of participants in this story made significant differences difficult to obtain, especially when the responses were separated by story. Secondly, there may have been a practice effect present since every participant had heard and been questioned on stories one and two before hearing story three. The data as a whole give the sense that story three was not as easily understood as were stories one and two. Only the oldest ($\overline{X}$ 186) age group immediately understood the metaphoric implications of the target sentence (stage 5) while the third age group ($\overline{X}$ 147) had reached stage 5 for stories one and two but not three. Further investigation needs to be undertaken with a larger number of participants and a randomly counter balanced story order.

The results of this study indicate that young children can understand metaphor if it is presented in the form of a pictorial analogy and grounded in a perceptual or functional domain. They can connect topic and vehicle, but their connections are sometimes not based on a metaphoric ground. As children procede through the development of concrete operations their metaphoric understandings and linguistic abilities increase, resulting in the ability to immediately comprehend and verbally explain metaphors, including those based on abstract

grounds. The presence of rudimentary comprehension in young children would suggest that both researchers and teachers have been short-changing children by ascribing to them a lack of comprehension. They thus deny children the opportunity to wrestle with metaphor, the only way in which to develop facility in its use and comprehension.

These results would indicate that we need to expose children to metaphor beginning, perhaps, with pictorial analogies. These analogies could be based in the perceptual domain and move toward the abstract domain. Further, we should provide our students with the opportunity to hear and discuss verbal metaphors which are embedded in a story context. The contextually relevant and supported use of metaphor allows metaphoric connections to be made without requiring a full explication. In short, we need to treat metaphoric understanding as a developmental phenomenon. This means that we focus not on what children can't do but on what they can do, and go on from there.

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Table 1

Children by Age

	Number	Age Range[a]	Average Age[a]
Age I	9	52-63	55
Age II	10	85-103	93
Age III	8	128-160	147
Age IV	9	179-196	186

a age in months

Table 2

Frequency of Responses by Age by Stage

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Total
Age I (X 55)	9	13	4	0	0	0	26
Age II (X 93)	0	22	4	3	1	0	30
Age III (X 147)	0	1	0	0	16	5	22
Age IV (X 186)	0	1	0	2	14	9	26

Table 3

Means and Standard Deviations
of Stages by Story and Age

	Story 1		Story 2		Story 3	
Age	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
$\bar{X}$ 55	1.625	.744	2.125	.640	1.875	.640
$\bar{X}$ 93	2.400	.699	2.700	1.059	2.200	.632
$\bar{X}$ 147	5.33	.516	5.166	.408	4.666	1.366
$\bar{X}$ 186	4.75	1.28	5.375	.517	5.375	.517

Table 4

I. One-way ANOVA Summaries for Age Effect on Story One

Source of Variation	df	SS	MS	F	p
Age	3	72.110	24.037	31.885	.001
Explained	3	72.110	24.037	31.885	.001
Residual	28	21.108	.754		
Total	31	93.219	3.007		

II. Multiple Comparisons (SNK) grouped at .05 level

$\bar{X}_1 = 1.556$

$\bar{X}_2 = 2.400$

$\bar{X}_3 = 5.375$ $\bar{X}_4 = 4.889$

Table 5

I. One-way ANOVA Summaries for Age Effect on Story Two

Source of Variation	df	SS	MS	F	p
Age	3	65.192	21.731	38.796	.001
Explained	3	65.192	21.731	38.796	.001
Residual	28	15.683	.560		
Total	31	80.875	2.609		

II. Multiple Comparisons (SNK) grouped at .05 level

$\bar{X}_1 = 2.111$ $\bar{X}_2 = 2.700$

$\bar{X}_3 = 5.125$ $\bar{X}_4 = 5.375$

Table 6

I. One-way ANOVA Summaries for Age Effect on Story Three

Source of Variation	df	SS	MS	F	p
Age	3	73.817	24.606	38.961	.001
Explained	3	73.817	24.606	38.961	.001
Residual	28	17.683	.632		
Total	31	91.500	2.952		

II. Multiple Comparisons (SNK) grouped at .05 level

$\overline{X}_1 = 1.875$ $\overline{X}_2 = 2.200$

$\overline{X}_3 = 4.667$ $\overline{X}_4 = 5.222$